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LAND RESOURCES: SOIL LOSS

Text submitted by the Chairman on the basis of negotiations held on document A/CONF.151/PC/100/Add.19

PROMOTING SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT

(Section II, chapter 6, of Agenda 21)

Attached is the text of A/CONF.151/PC/100/Add.19 as agreed in negotiations on 13, 14 and 17 March 1992. The paragraphs in the Introduction, and those under the headings "Basis for action" and "Means of implementation" have not been negotiated: language on these points will be inserted later, based on the results of ongoing consideration of cross-sectoral issues. Programme areas G and H, on conservation and sustainable utilization of plant and animal genetic resources for agriculture have not been discussed, in order to benefit from the upcoming discussions on biodiversity and biotechnology.

INTRODUCTION

1. By the year 2025, 83 per cent of the expected global population of 8.5 billion will be living in developing countries. Yet the capacity of available resources and technologies to satisfy the demands of this growing population for food and other agricultural commodities remains uncertain. **(A/CONF.151/PC/61/para. 22)‹ Agriculture has to meet this challenge, mainly by increasing the production on land already in use, and by avoiding further encroachment on land that is only marginally suitable.›**

2. The Secretary-General of the Conference, in A/CONF.151/PC/61, presented the Den Bosch Declaration on Sustainable Agriculture and Rural Development at the Third Preparatory Committee in compliance with the request of the Second Preparatory Committee meeting. There was general agreement on the list of programme areas contained in Options for Agenda 21 in Promoting Sustainable Agriculture and Rural Development (A/CONF.151/PC/WG.I/CRP.12/Rev.1).

3. Major adjustments are needed in agricultural, environmental and macroeconomic policy, at both national and international levels, in developed as well as developing countries, to create the conditions for sustainable agriculture and rural development (SARD). The major objective of SARD is to increase food production and food security. This will involve ensuring an appropriate balance between self-sufficiency and production for markets; employment and income generation to alleviate poverty; and natural resource management and environmental protection.

4. The priority must be on maintaining and improving the capacity of the higher potential agricultural lands to support an expanding population. However, conserving and rehabilitating the natural resources on lower potential lands in order to maintain sustainable man/land ratios is also necessary. The main tools of SARD are policy and agrarian reform, participation, income diversification, land conservation and improved management of inputs. The success of SARD will depend largely on the support and participation of rural people, national Governments, the private sector and international cooperation, including technical and scientific cooperation.

5. A list of the programme areas is as follows:

A. Agricultural policy review, planning and integrated programming in light of the multifunctional aspect of agriculture, particularly with regard to food security and sustainable development

B. Ensuring people's participation and promoting human resources development for sustainable agriculture

C. Improving farm production and farming systems through diversification of farm and non-farm employment and infrastructure development

D. Land resources planning information and education for agriculture

E. Land conservation and rehabilitation

F. Water for sustainable food production and sustainable rural development (see reference note 5/)

G. Conservation and sustainable utilization of plant genetic resources for sustainable agriculture

H. Conservation and sustainable utilization of animal genetic resources for sustainable agriculture

I. Integrated pest management and control in agriculture

J. Sustainable plant nutrition to increase food production

K. Rural energy transition to enhance productivity

L. Evaluation of the effects of ultraviolet radiation caused by the depletion of stratospheric ozone layer on agriculture (see reference note 8/).

PROGRAMME AREAS

A. AGRICULTURAL POLICY REVIEW, PLANNING AND INTEGRATED PROGRAMMES IN LIGHT OF THE MULTIFUNCTIONAL ASPECT OF AGRICULTURE, PARTICULARLY WITH REGARD TO FOOD SECURITY AND SUSTAINABLE DEVELOPMENT

Basis for action

6. **(PC/WG.I/CRP.12/Rev.1, para. 28)< There is a need to integrate sustainable development considerations with agricultural policy analysis and planning in all countries, particularly in developing countries. The recommendations should contribute directly to development of realistic and operational medium- to long-term plans and programmes, and thus to concrete actions. Support to and monitoring of implementation should follow.>**

7. The absence of a coherent national policy framework for sustainable agriculture and rural development (SARD) is widespread and is not limited to the developing countries. In particular the economies in transition from planned to market-oriented systems need such a framework to incorporate environmental considerations into economic activities, including agriculture. All countries need to assess comprehensively the impacts of such policies on food and agriculture sector performance, on food security, rural welfare and international trading relations as a means for identifying appropriate offsetting measures. The major thrust of food security in this case is to bring a substantial improvement in agricultural production and the alleviation of poverty and improvement of the quality of life of the rural population.

8. Sound policy decisions pertaining to international trade and capital flows also necessitate action to overcome: (a) a lack of awareness of the environmental costs incurred by sectoral and macroeconomic policies and hence their threat to sustainability; (b) insufficient skills and experience in incorporating issues of sustainability into policies and programmes; and (c) inadequacy of tools of analysis and monitoring. 1/

Objectives

9. By 1995, to review and, where appropriate, establish a programme to integrate environmental and sustainable development with policy analysis for

the food and agriculture sector and relevant macroeconomic policy analysis, formulation and implementation.

10. To maintain and develop, as appropriate, operational multi-sectoral plans, programmes and policy measures, including programmes and measures to enhance sustainable food production and food security within the framework of sustainable development no later than 1998.

11. To maintain and enhance the capability of developing countries, and particularly the least developed ones, to themselves manage policy, programming and planning activities no later than 2005.

Activities

Management:

12. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Carry out national policy reviews related to food security including adequate levels and stability of food supply and access to food by all households;

(b) Review national and regional agricultural policy in relation to inter alia foreign trade, price policy, exchange rate policies, agricultural subsidies and taxes, as well as organization for regional economic integration;

(c) Implement policies to positively influence land tenure and property rights with due recognition of minimum size of land holding to maintain production and check further fragmentation;

(d) Consider demographic trends and population movements and identify critical areas for agricultural production;

(e) Formulate, introduce and monitor policies, laws and regulations and incentives, leading to sustainable agricultural and rural development and improved food security; and to the development and transfer of appropriate farm technologies, including, where appropriate, low-input sustainable agricultural (LISA) systems;

(f) Support national and regional early warning systems through food security assistance schemes that monitor food supply/demand and factors affecting household access to food;

(g) Review policies with respect to improving harvesting, storage, processing, distribution, and marketing of products at the local, national, and regional levels;

(h) Formulate and implement integrated agricultural projects that include other natural resources activities, such as rangelands, forest, and wildlife management, as appropriate;

(i) Promote social and economic research and policies that encourage sustainable agriculture development particularly in fragile ecosystems and densely populated areas;

(j) Identify storage and distribution problems affecting food availability; support research, where necessary, to overcome these problems and cooperate with producers and distributors to implement improved practices and systems.

Data and information:

13. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Cooperate actively to expand and improve the information and early warning system on food and agriculture at both regional and national level;

(b) Examine and undertake surveys and research to establish baseline information on the status of natural resources relating to food and agriculture production and planning in order to assess the impacts of various uses on these resources, and develop methodologies and tools of analysis, such as environmental accounting;

International and regional cooperation and coordination:

14. United Nations agencies such as FAO, the World Bank, IFAD, GATT and regional organizations and bilateral donor agencies and other bodies should assume a role in working with national Governments in the following activities:

(a) Implement integrated and sustainable agricultural development and food security strategies at subregional level that use regional production and trade potentials including organizations for regional economic integration to promote food security;

(b) [Harmonize agricultural trade policies and integrate them closely with environmental policies to prevent trade protectionism, and restricted access to agricultural markets];

(c) Strengthen and establish national, regional and international systems and networks to understand the interaction between agriculture and the state of the environment, identify ecologically sound technologies, and exchange information on data sources, policies, and techniques and tools of analysis;

(d) [Integrate agricultural and environment policies with a view to promoting sustainable agriculture in the context of relevant internationally agreed principles on trade and environment.]

Means of implementation

Financing and cost evaluation:

15. The total financing required to implement this programme area is about US$ 3,000 million per year, including international concessional financing of about US$ 450 million. This includes about US$ 430 million for accelerated development and US$ 20 million for strengthening the capacity of international institutions.

Scientific and technological means:

16. National Governments and appropriate international and non-governmental organizations (NGOs) should assist farming households and communities to apply technologies related to improved food production and security, including storage, monitoring of production and distribution.

Human resources development:

17. National Governments should:

(a) Involve and train local economists, planners and analysts to initiate national and international policy reviews and develop frameworks for sustainable agriculture;

(b) Establish legal measures to promote access of women to land and remove biases in their involvement in rural development.

Capacity-building:

18. National Governments with the support of appropriate international and regional institutions should strengthen the ministries for agriculture, natural resources and planning.

B. ENSURING PEOPLE'S PARTICIPATION AND PROMOTING HUMAN RESOURCES DEVELOPMENT FOR SUSTAINABLE AGRICULTURE

Basis for action

19. **(PC/WG.I/CRP.12/Rev.1, para. 32)< This component bridges policy and integrated resource management. The greater the degree of community control over the resources on which it relies, the greater will be the incentive for economic and human resources development. At the same time, policy instruments to reconcile long-run and short-run requirements must be set by the national Government. The approaches focus on fostering self-reliance and cooperation, providing information, and supporting user-based organizations.>** **(PC/WG.I/CRP.12/Rev.1, para. 33)< Emphasis should be on management practices, building agreements for changes in resource utilization: the rights and duties associated with use of land, water and forests, the functioning of markets, prices, and the access to information, capital and

inputs. This would require training and capacity building to assume greater responsibilities in sustainable development efforts.>**2/, 3/

Objectives

20. Promote greater public awareness of the role of people's participation and people's organizations, especially women's groups, youth, indigenous people, local communities and small farmers, in sustainable agriculture and rural development.

21. Ensure equitable access of rural people, particularly women, small farmers, landless, and indigenous people, to land, water, forest resources, and to technologies, financing, marketing, processing and distribution.

22. Strengthen and develop the management and the internal capacities of rural people's organizations and extension services, and decentralize decision-making at the lowest community level.

Activities

Management:

23. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) Develop and improve integrated agricultural extension services and facilities and rural organizations and undertake natural resource management and food security activities, taking into account the different needs of subsistence agriculture as well as market-oriented crops;

(b) Review and refocus existing measures to achieve wider access to land, water and forest resources and ensure equal rights of women and other disadvantaged groups, with particular emphasis on rural populations, indigenous peoples and local communities;

(c) Assign clear titles, rights and responsibilities for land and for individuals or communities to encourage investment in land resources;

(d) Develop guidelines for decentralization policies for rural development through reorganization and strengthening of rural institutions;

(e) Develop policies in extension, training, pricing, input distribution, credit and taxation to ensure necessary incentives and equitable access by the poor to production-support services;

(f) Provide support services and training, recognizing the variation in agricultural circumstances and practices by location: the optimum use of on-farm inputs and the minimal use of external inputs; optimum use of local natural resources and management of renewable energy sources; and the establishment of networks that deal with the exchange of information on alternative forms of agriculture.

Data and information:

24. Governments at the appropriate level, with the support of the relevant international and regional organizations, should collect, analyse, and disseminate information on human resources, the role of Governments, local communities and NGOs in social innovation and strategies for rural development.

International and regional cooperation and coordination:

25. Appropriate international and regional agencies should:

(a) Reinforce their work with NGOs in collecting and disseminating information on people's participation and people's organizations, testing participatory development methods, training and education for human resource development and strengthening management structures of rural organizations;

(b) Help develop information available through NGOs and promote an international ecological agricultural network to accelerate development and implementation of ecological agriculture practices.

Means of implementation

Financing and cost evaluation:

26. The total financing required to implement this programme area is about US$ 4,400 million per year, including international concessional financing of about US$ 650 million. This includes US$ 640 million for accelerated development and US$ 10 million for strengthening international institutions.

Scientific and technological means:

27. National Governments, international and regional organizations should:

(a) Encourage people's participation on farm technology development and transfer, incorporating indigenous ecological knowledge and practices;

(b) Launch applied research on participatory methodologies, management strategies, and local organizations.

Human resources development:

28. Governments should provide management and technical training to government administrators and members of resource user groups in the principles, practice and benefits of people's participation in rural development.

Capacity-building:

29. Governments should introduce management strategies and mechanisms, such as accounting and audit services for rural people's organizations and institutions for human resources development; delegate administrative and financial responsibilities to local levels for decision-making, revenue-raising and expenditure.

C. IMPROVING FARM PRODUCTION AND FARMING SYSTEMS THROUGH DIVERSIFICATION OF FARM AND NON-FARM EMPLOYMENT AND INFRASTRUCTURE DEVELOPMENT

Basis for action

30. **(PC/WG.I/CRP.12/Rev.1, para. 38)< Agriculture needs to be intensified to meet future demands for commodities and to avoid further expansion onto marginal lands and encroachment on fragile ecosystems. Increased use of external inputs and development of specialized production and farming systems tend to increase vulnerability to environmental stresses and market fluctuations. There is, therefore, a need to intensify agriculture by diversifying the production systems for maximum efficiency in the utilization of local resources while minimizing environmental and economic risks. Where intensification of farming systems is not possible, other on and off-farm employment opportunities should be identified and developed, such as cottage industries, wildlife utilization, aquaculture and fisheries, non-farm activities, such as light village-based manufacturing, farm commodity processing, agribusiness, recreation and tourism, etc.>**

Objectives

31. To improve farm productivity in a sustainable manner as well as increase diversification, efficiency, food security and rural incomes, while ensuring that risks to the ecosystem are minimized.

32. To enhance the self-reliance of farmers to develop and improve rural infrastructure, and facilitate transfer of environmentally sound technologies for integrated production and farming systems including indigenous technologies and the sustainable use of biological and ecological processes, including agroforestry, sustainable wildlife conservation and management, aquaculture, inland fisheries, and animal husbandry.

33. To create farm and non-farm employment opportunities particularly among the poor and those living in marginal areas, taking into account the alternative livelihood proposal inter alia on dryland areas.

Activities

Management:

34. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) Develop and disseminate to farming households integrated farm management technologies, such as crop rotation, organic manuring and other techniques involving reduced use of agricultural chemicals, multiple techniques for sources of nutrients and the efficient utilization of external inputs, while enhancing techniques for waste and by-product utilization and prevention of pre- and post-harvest losses, taking particular note of the role of women.

(b) Create non-farm employment opportunities through private small-scale agro-processing units, rural service centres and related infrastructural improvements;

(c) Promote and improve rural financial networks which utilize investment capital resources raised locally;

(d) Provide the essential rural infrastructure for access to agricultural inputs and services as well as to national and local markets, and reduce food losses;

(e) Initiate and maintain farm surveys, on-farm testing of appropriate technologies and dialogue with rural communities to identify constraints and bottlenecks and find solutions;

(f) Analyse and identify possibilities for economic integration of agricultural and forestry activities, as well as water and fisheries; and take effective measures to encourage forest management/growing of trees by farmers (farm forestry) as an option for resource development.

Data and information:

35. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) Analyse the effects of technical innovations and incentives on farm-household income and well-being;

(b) Initiate and maintain on-farm and off-farm programmes to collect and record indigenous knowledge.

International and regional cooperation and coordination:

36. International institutions such as FAO, International Fund for Agricultural Development (IFAD), international agricultural research centres (CGIAR) as well as regional centres should diagnose the world's major agro-ecosystems, their extension, ecological and socio-economic characteristics, their susceptibility to deterioration, and their productive potential. This could form the basis for technology development and exchange, and regional research collaboration.

Means of implementation

Financing and cost evaluation:

37. The total financing required to implement this programme area is about US$ 10,000 million per year, including international concessional financing of about US$ 1,500 million. This includes US$ 10 million for strengthening international institutions. The remaining amount is for development.

Scientific and technological means:

38. Governments with the support of the international community should strengthen research on agricultural production systems in areas with different endowments and agro-ecological zones, including comparative analysis between intensification and diversification and different levels of external and internal inputs.

Human resources development:

39. National Governments should:

(a) Promote educational and vocational training for farmers and rural communities through formal and non-formal education;

(b) Launch awareness and training programmes for entrepreneurs, managers, bankers and traders in rural servicing and small-scale agro-processing techniques.

Capacity-building:

40. National Governments should:

(a) Improve their organizational capacity to deal with issues related to off-farm activities and rural industry development;

(b) Expand credit facilities and rural infrastructure related to processing, transportation and marketing.

D. LAND RESOURCES PLANNING, INFORMATION AND EDUCATION FOR AGRICULTURE

Basis for action

41. **(PC/WG.I/CRP.12/Rev.1, para. 45)< Inappropriate and uncontrolled land uses are a major cause of degradation and depletion of land resources. Present land use often disregards the actual potentials, carrying capacities and limitations of land resources, as well as their diversity in space. The world's population, now at 5.4 billion, is estimated to be 6.25 billion by the turn of the century. The need to increase food production to meet the

expanding needs of the population will put enormous pressure on all natural resources, including land.>**

42. Poverty and malnutrition are already endemic in many regions. The destruction and degradation of agricultural and environmental resources is a major issue. Techniques for increasing production and conserving soil and water resources are already available, but are not widely or systematically applied. A systematic approach is needed for identifying land uses and production systems that are sustainable in each land and climate zone, including the economic, social and institutional mechanisms necessary for their implementation. 4/

Objectives

43. To harmonize planning procedures, involve farmers in the planning process, collect land resource data, design and establish databases, define land units, calculate their potential outputs, and select the most suitable resource uses.

44. To establish agricultural planning bodies at national and local levels to decide priorities, channel resources, and implement programmes.

Activities

Management:

45. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) Establish and strengthen agricultural land use and land resource departments of planning, management, education and information, at national and local levels;

(b) Initiate and maintain district and village agricultural land resources planning, management and conservation groups to assist in problem identification, development of technical and management solutions, and project implementation.

Data and information:

46. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) Collect, continuously monitor, update and disseminate information, whenever possible, on the utilization of natural resources and living conditions, climate, water and soil factors, and on land use, distribution of vegetation cover and animal species, wild plants utilization, production systems and yields, costs and prices, and social and cultural considerations which affect agricultural and adjacent land use;

(b) Establish programmes to provide information, promote discussion, and encourage the formation of management groups.

International and regional cooperation and coordination:

47. The appropriate United Nations agencies and regional organizations should:

(a) Strengthen or establish international, regional and subregional technical working groups with specific terms of reference and budgets to promote integrated use of land resources for agriculture, in planning, data collection, and diffusion of simulation models of production and information dissemination;

(b) Develop internationally acceptable methodologies for establishment of databases, description of land uses, and multiple goal optimization.

Means of implementation

Financing and cost evaluation:

48. The total financing required to implement this programme area is about US$ 1,700 million per year, including international concessional financing of about US$ 250 million. This includes US$ 2 million for strengthening international institutions. The remaining amount is for development.

Scientific and technological means:

49. National Governments should:

(a) Develop databases and geographical information systems to store and display physical, social and economic information pertaining to agriculture, and the definition of ecological zones and development areas.

(b) Select combinations of land uses and production systems appropriate to land units through multiple goal optimization procedures, strengthen delivery systems and local community participation;

(c) Encourage integrated planning at the watershed and landscape level to reduce soil loss and protect surface and groundwater resources from chemical pollution.

Human resources development:

50. National Governments should:

(a) Train professionals and planning groups at national, district, and village level through formal and informal instructional courses, travel and interaction;

(b) Generate discussion at all levels on policy, development and environmental issues related to agricultural land use and management, through media programmes, conferences, and seminars.

Capacity-building:

51. National Governments, in cooperation with appropriate international agencies, should:

(a) Establish land resources mapping and planning units at national, district, and village levels to act as focal points and links between institutions and disciplines, and between Governments and people.

(b) Establish or strengthen Governments and international institutions with responsibility for agricultural resource survey, management, and development; rationalize and strengthen legal frameworks; and provide equipment and technical assistance.

E. LAND CONSERVATION AND REHABILITATION

Basis for action

52. **(PC/WG.I/CRP.12/Rev.1, para. 48)‹ Land degradation is the most important environmental problem affecting extensive areas of land in both developed and developing countries. The problem of soil erosion is particularly acute in developing countries, while problems of salinization, waterlogging, soil pollution and loss of soil fertility are increasing in all countries. Land degradation is serious because the productivity of huge areas of land is declining just when populations are increasing rapidly and the demand on the land is growing to produce more food, fibre and fuel. Efforts to control land degradation, particularly in developing countries, have had limited success to date. Well planned, long-term national and regional land conservation and rehabilitation programmes, with strong political support and adequate funding, are now needed. While land use planning and land zoning, combined with better land management, should provide long-term solutions, it is urgent to arrest land degradation and launch conservation and rehabilitation programmes in the most critically affected and vulnerable areas.›**

Objectives

53. By 2000, to review and initiate as appropriate national land resource surveys, detailing the location, extent and severity of land degradation.

54. To prepare and implement comprehensive policies and programmes leading to the reclamation of degraded lands and the conservation of areas at risk, as well as improve the general planning, management and utilization of land resources and preserve soil fertility for sustainable agricultural development.

Activities

Management:

55. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Develop and implement programmes to remove and resolve the physical, social and economic causes of land degradation, such as land tenure, appropriate trading systems and agricultural pricing structures which lead to inappropriate land use management;

(b) Provide incentives and, where appropriate, resources for the participation of local communities in the planning, implementation and maintenance of their own conservation and reclamation programmes;

(c) Develop and implement programmes for the rehabilitation of land degraded by water-logging and salinity;

(d) Develop and implement programmes for the progressive use of non-cultivated land with agricultural potential in a sustainable way.

Data and information:

56. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) Conduct periodic surveys to assess the extent and state of each nation's land resources;

(b) Strengthen and establish national land resource data banks, including identification of the location, extent and severity of existing land degradation as well as areas at risk and evaluate the progress of the conservation and rehabilitation programmes launched in this regard;

(c) Collect and record information on indigenous conservation and rehabilitation practices and farming systems as a basis for research and extension programmes.

International and regional cooperation and coordination:

57. The appropriate United Nations agencies, regional organizations and NGOs should:

(a) Develop priority conservation and rehabilitation programmes with advisory services to Governments and regional organizations;

(b) Establish regional and subregional networks for scientists and technicians to exchange experiences, develop joint programmes and spread successful technologies on land conservation and rehabilitation.

Means of implementation

Financing and cost evaluation:

58. The total financing required to implement this programme area is about US$ 5,000 million per year, including international concessional financing of about US$ 800 million. This includes US$ 10 million for strengthening international institutions. The remaining amount is for development.

Scientific and technological means:

59. National Governments, appropriate United Nations agencies and international and national research centres should assist farming household communities to investigate and promote site specific technologies and farming systems that conserve and rehabilitate land, while increasing agricultural production, including conservation tillage agroforestry, terracing and mixed cropping.

Human resources development:

60. National Governments should train field staff and land users in indigenous and modern techniques of conservation and rehabilitation, and establish training facilities for extension staff and land users.

Capacity-building:

61. National Governments, appropriate United Nations agencies and international and national research centres, should:

(a) Develop and strengthen national research institutional capacity to identify and implement effective conservation and rehabilitation practices that are appropriate to the existing socio-economic physical conditions of the land users;

(b) Coordinate all land conservation and rehabilitation policies, strategies and programmes with related ongoing programmes, such as national environment action plans, the Tropical Forestry Action Plan and national development programmes.

F. WATER FOR SUSTAINABLE FOOD PRODUCTION AND SUSTAINABLE RURAL DEVELOPMENT

62. This programme area is included under "Freshwater resources", programme area F. 5/

G. CONSERVATION AND SUSTAINABLE UTILIZATION OF PLANT GENETIC RESOURCES FOR SUSTAINABLE AGRICULTURE

Basis for action

63. **(PC/WG.I/CRP.12/Rev.1/para. 58)< Plant genetic resources for agriculture (PGRA) are an essential resource to meet future needs for food. Threats to the security of these resources are growing, and efforts to conserve, develop and use genetic diversity are underfunded and understaffed. Many existing genebanks provide inadequate security and, in some instances, the loss of plant genetic diversity in genebanks is as great as it is in the field. Therefore, there is an urgent need to strengthen global initiatives for security [and sharing of the results of biotechnology derived from these genetic materials.]>**

64. **(PC/WG.I/CRP.12/Rev.1/paras. 59-60)< The primary objective is to safeguard the world's genetic resources while preserving them to use sustainably. This includes the development of measures to facilitate the conservation and use of plant genetic resources, networks of in situ conservation areas and use of tools such as ex situ collections, germ plasma banks, and biotechnology. Special emphasis could be placed on the building of endogenous capacity for characterization, evaluation and utilization of PGRA, particularly for the minor crops and other underutilized or non-utilized species of food and agriculture, including tree species for agro-forestry. Subsequent action could be aimed at consolidation and efficient management of networks of in situ conservation areas and use of tools such as ex situ collections, germ plasma banks, and biotechnology.>**

65. Major gaps and weaknesses exist in the capacity of existing national and international mechanisms to assess, study, monitor and use plant genetic resources to increase food production. Existing institutional capacity, structures and programmes are generally inadequate and largely underfunded. There is genetic erosion of invaluable crop species. Existing diversity in crop species is not used to the extent possible for increased food production in a sustainable way. 6/

Objectives

66. By 2000, to complete this first regeneration and safe duplication of all existing ex situ collections on a world-wide basis.

67. By 2000, to collect and study plants useful for increasing food production through joint activities and training of networks of collaborating institutions.

68. By 2010, to integrate PGRA into sustainable agriculture programmes world wide.

Activities

Management:

69. Governments at the appropriate level, with the support of the relevant international and regional organizations should:

(a) **(PC/WG.I/CRP.12/Rev.1/paras. 14-15)< Develop and strengthen institutional capacity, structures and programmes for conservation and use of PGRA;

(b) Strengthen research in the public domain on PGRA utilization, with the objectives of sustainable agriculture and rural development in view;

(c) Develop multiplication/propagation, exchange and dissemination facilities for PGRAs (seeds and planting materials), particularly in developing countries; monitoring, control and evaluation of plant introductions.>**

Data and information:

70. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) **(PC/WG.I/CRP.12/Rev.1, p. 15)< [Develop strategies for networks of in situ conservation areas and use of tools such as ex situ collections, germplasm banks, and biotechnology];

(b) Establish ex situ base collection networks;

(c) Prepare periodic "state-of-the-world" reports on PGRA;>**

(d) Characterize and evaluate PGRA material collected; disseminate information to facilitate the use of PGRA collections, and assess genetic variation in collections.

International and regional cooperation and coordination:

71. The appropriate United Nations agencies and regional organizations should:

(a) **(PC/WG.I/CRP.12/Rev.1, p. 15)< Establish a global system for exchange of technologies and information and early warning systems on PGRA;

(b) Organize a Fourth International Conference on PGRA;

(c) [Prepare a rolling global plan of action on PGRA];

(d) [Develop mechanisms to realize farmers' rights] or alternatively, add [develop mechanisms on breeders' rights];

(e) [Develop further legal instruments, as appropriate].>**

Means of implementation

Financing and cost evaluation:

72. The total financing required to implement this programme area is about US$ 600 million per year, including international concessional financing of about US$ 300 million. This includes about US$ 10 million for strengthening international institutions, the remaining US$ 290 million to be divided between development and global environmental issues.

Scientific and technological means:

73. National Governments, in cooperation with the appropriate international and national research centres, should:

(a) Develop basic science research in areas such as plant taxonomy and phytogeography, utilizing recent developments, such as computer sciences, molecular genetics and in vitro cryopreservation;

(b) Develop major collaborative projects between research programmes in developed and developing countries, particularly for the enhancement of poorly known or neglected crops;

(c) Promote cost-effective technologies for keeping duplicate sets of ex situ collections (that can also be used by local communities);

(d) Develop further conservation sciences in relation to in situ conservation and technical means to link it with ex situ conservation efforts.

Human resources development:

74. National Governments, in cooperation with the appropriate international and national research centres, should:

(a) Promote training programmes at both undergraduate and post-graduate levels in conservation sciences for running PGRA facilities and for the design and implementation of national programmes in PGRA;

(b) Raise the awareness of agricultural extension services in order to link PGRA activities with user communities;

(c) Develop training materials to promote conservation and utilization of PGRA at local level.

Capacity-building:

75. National Governments should:

(a) Establish national policies to provide legal status and strengthen legal aspects of PGRA, including long-term financial commitment for germplasm collections and implementation of activities in PGRA;

(b) Promote the concept of farmers' rights and ensure its effective introduction.

H. CONSERVATION AND SUSTAINABLE UTILIZATION OF ANIMAL GENETIC RESOURCES FOR SUSTAINABLE AGRICULTURE

Basis for action

76. **(PC/WG.I/CRP.12/Rev.1, para. 63)< The need for increased quantity and quality of animal products and for draught animals calls for conservation of the existing diversity of animal breeds to meet future requirements, including those for use in biotechnology. Some local animal breeds have unique attributes for adaptation, disease resistance and specific uses which, in addition to their socio-cultural value, should be preserved. These local breeds are threatened by extinction as a result of the introduction of exotic breeds and of changes in livestock production systems.>**

Objectives

77. By 1994, to enumerate all breeds of livestock used in animal agriculture and begin a 10-year programme of action.

78. By 2000, to establish action programmes to identify up to 500 breeds at risk together with appropriate preservation measures.

79. By 2000, to establish development programmes for up to 100 indigenous breeds in order to guarantee their survival, avoiding the risk of their being replaced by breed substitution or cross-breeding programmes.

Activities

Management:

80. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) Draw up breed preservation plans, for endangered populations, including semen/embryo collection and storage, or in situ preservation;

(b) Plan and initiate breed development strategies;

(c) Select indigenous populations on the basis of regional importance and genetic uniqueness, for a (first-phase) seven-year programme, followed by selection of an additional cohort of indigenous breeds for development.

Data and information:

81. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) **(PC/WG.I/CRP.12/Rev.1, para. 65)< Prepare and complete national inventories of available animal genetic resources. Cryogenic storage could be given priority over characterization and evaluation. Training of nationals in conservation and assessment techniques would be given special attention.>**

(b) Prepare and publish a global inventory of animal genetic resources, describing each breed, its effective population size and a limited set of key production parameters;

(c) Prepare and publish a World Watch list on farm animal species at risk to enable national Governments to take action to preserve endangered breeds and to seek technical assistance, where necessary.

International and regional cooperation and coordination:

82. The appropriate United Nations and regional agencies should:

(a) Promote the establishment of regional gene banks to the extent that they are justified, based on principles of technical cooperation among developing countries (TCDC);

(b) **(PC/WG.I/CRP.12/Rev.1, para. 67)< Process, store and analyse animal genetic data at the global level, including: production of a World Watch list and Early Warning of Endangered Breeds; global assessment of scientific and intergovernmental guidance of the programme and review of regional and national activities; development of methodologies, norms and standards (including international agreements), monitoring of their implementation and related technical and financial assistance;>**

(c) Undertake research in gene technology/genome mapping to demonstrate that many breeds share a common DNA heritage that may enable geneticists to sharpen the scientific rigour of choosing which breeds should be preserved.

Means of implementation

Financing and cost evaluation:

83. The total financing required to implement this programme area is about US$ 200 million per year, including international concessional financing of about US$ 100 million. This includes about US$ 10 million for strengthening international institutions, the remaining US$ 80 million to be divided between development and global environmental issues.

Scientific and technological means:

84. National Governments should:

(a) Use computer-based data banks and questionnaires to prepare a Global Inventory/World Watch list;

(b) Using cryogenic storage of germplasm, preserve breeds at serious risk and other material from which genes can be reconstructed.

Human resources development:

85. National Governments, in cooperation with the appropriate international and national research centres, should:

(a) Sponsor training courses for nationals to obtain the necessary expertise for data collection and handling and for the sampling of genetic material;

(b) Enable scientists and managers to establish an information base for indigenous livestock breeds and promote programmes to develop and conserve essential livestock genetic material.

Capacity-building:

86. National Governments should:

(a) Establish in-country facilities for artificial insemination centres and in situ breeding farms;

(b) Promote in-country programmes and related physical infrastructure for animal livestock conservation and breed development, as well as for strengthening national capacities to take preventive action when breeds are endangered.

I. INTEGRATED PEST MANAGEMENT AND CONTROL IN AGRICULTURE

Basis for action

87. **(PC/WG.I/CRP.12/Rev.1, para. 68)< World food demand projections indicate an increase of 50 per cent by the year 2000; which will more than double again by 2050. Conservative estimates put pre- and post-harvest losses caused by pests between 25 and 50 per cent. Pests affecting animal health also cause heavy losses and in many areas prevent livestock development. Chemical control of agricultural pests has dominated the scene, but its overuse has adverse effects on the farm budgets, human health and the environment as well as on international trade. New pest problems continue to develop. Integrated pest management, which combines biological control, host plant resistance, and appropriate farming practices and minimizes the use of pesticides, is the best option for the future, as it guarantees yields, reduces costs, is environmentally friendly and contributes to the sustainability of agriculture. Integrated pest management should go hand in hand with appropriate pesticide management to allow for pesticide regulation and control, including trade and for the safe handling and disposal of pesticides particularly those that are toxic and persistent.>**

Objectives

88. No later than the year 2000 to improve and implement plant protection and animal health services, including mechanisms to control the distribution and use of pesticides; and implement the International Code of Conduct on the Distribution and Use of Pesticides.

89. To improve and implement programmes to put integrated pest management practices within the reach of the farmers through farmer networks, extension services and research institutions.

90. No later than the year 1988 to establish operational and interactive networks among farmers, researchers and extension services to promote and develop integrated pest management.

Activities

Management:

91. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) Review and reform national policies and the mechanisms that would ensure the safe and appropriate use of pesticides, for example, pesticide pricing, pest control brigades, price-structure of inputs and outputs and integrated pest management policies and action plans;

(b) Develop and adopt efficient management systems to control and monitor the incidence of pests and disease in agriculture and the distribution and use of pesticides at country level;

(c) Encourage research and development into pesticides that are target specific and readily degrade into harmless constituent parts after use;

(d) Ensure that pesticide labels provide farmers with understandable information about safe handling, application and disposal.

Data and information:

92. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) Consolidate and harmonize existing information and programmes on pesticides uses that have been banned or severely restricted in different countries;

(b) Consolidate, document and disseminate information on biological control agents and organic pesticides, as well as on traditional and other relevant knowledge and skills regarding alternative non-chemical ways of controlling pests;

(c) Undertake national surveys to establish baseline information on the use of pesticides in each country and the side-effects on human health and environment, and also to undertake appropriate education.

International and regional cooperation and coordination:

93. Appropriate United Nations agencies and regional organizations should:

(a) Establish a system for collecting, analysing and disseminating data on the quantity and quality of pesticides used every year and their impact on human health and the environment;

(b) Strengthen regional interdisciplinary projects and establish IPM networks to demonstrate the social, economic and environmental benefits of integrated pest management for food and cash crops in agriculture.

Means of implementation

Financing and cost evaluation:

94. The total financing required to implement this programme area is about US$ 1,900 million per year, including international concessional financing of about US$ 285 million. This includes US$ 275 million for accelerated development, US$ 7 million for global environmental issues and US$ 3 million for strengthening the capacity of international institutions.

Scientific and technological means:

95. National Governments, in cooperation with the appropriate United Nations agencies and international and regional research centres, should launch on-farm research in the development of non-chemical alternative pest management technologies.

Human resources development:

96. National Governments, in cooperation with the appropriate United Nations agencies and international and regional research centres, should:

(a) Prepare and conduct training programmes on approaches and techniques for integrated pest management and control of pesticide use, to inform policy makers, researchers, NGOs and farmers;

(b) Train extension agents, and involve farmers and women's groups, in crop health and alternative non-chemical ways of controlling pests in agriculture.

Capacity-building:

97. National Governments should strengthen national public administrations and regulatory bodies in the control of pesticides and the transfer of technology for integrated pest management.

J. SUSTAINABLE PLANT NUTRITION TO INCREASE FOOD PRODUCTION

Basis for action

98. **(PC/WG.I/CRP.12/Rev.1, para. 71)‹ Plant nutrient depletion is a serious problem resulting in loss of soil fertility, particularly in developing countries. To maintain soil productivity, FAO's sustainable plant nutrition programmes could be helpful. In sub-Saharan Africa, nutrient output from all sources currently exceeds inputs by a factor of three or four, the net loss being estimated at some 10 million metric tons per year. As a result, more marginal lands and fragile natural ecosystems are put under agricultural use, thus creating further land degradation and other environmental problems.›** **(PC/WG.I/CRP.12/Rev.1, para. 72)‹ The integrated plant nutrition approach aims at ensuring a sustainable supply of plant nutrients to increase future yields without harming the environment and soil productivity.›**

99. In many developing countries, population growth rates exceed 3 per cent a year, and national agricultural production has fallen behind food demand. In these countries the goal should be to increase agricultural production by at least 4 per cent a year, without destroying the soil fertility. This will require increasing agricultural production in high potential areas through efficiency in the use of inputs. Trained labour, energy supply, adapted tools and technologies, plant nutrients and soil enrichment will all be essential.

Objectives

100. No later than the year 2000, to develop and maintain in all countries the integrated plant nutrition approach, and to optimize availability of fertilizer and other plant nutrient sources.

101. No later than the year 2000, to establish and maintain institutional and human infrastructure to enhance effective decision-making on soil productivity.

102. To develop and make available national and international know-how to farmers, extension agents, planners and policy makers on environmentally sound new and existing technologies and soil fertility management strategies for application in promoting sustainable agriculture.

Activities

Management:

103. Governments at the appropriate level, and with the support of the relevant international and regional organizations, should:

(a) Formulate and apply strategies that will enhance soil fertility maintenance to meet sustainable agricultural production and adjust the relevant agricultural policy instruments accordingly;

(b) Integrate organic and inorganic sources of plant nutrients in a system to sustain soil fertility and determine mineral fertilizer needs;

(c) Determine plant nutrients requirements, supply strategies and optimize the use of both organic and inorganic sources, as appropriate, to increase farming efficiency and production;

(d) Develop and encourage processes for the recycling of organic and inorganic waste into the soil structure without harming the environment, plant growth and human health.

Data and information:

104. Governments, at the appropriate level and with the support of the relevant international and regional organizations, should:

(a) Assess "national accounts" for plant nutrients, including supplies (inputs) and losses (outputs), prepare balance sheets and projections by cropping systems;

(b) Review technical and economic potentials of plant nutrient sources, including national deposits, improved organic supplies, recycling, wastes, topsoil produced from discarded organic matter and biological nitrogen fixation.

International and regional cooperation and coordination:

105. The appropriate United Nations agencies such as FAO, the international agricultural research institutes, and NGOs should collaborate in carrying out information and publicity campaigns about the integrated plant nutrients approach, efficiency of soil productivity and their relationship to the environment.

Means of implementation

Financing and cost evaluation:

106. The total financing required to implement this programme area is about US$ 3,200 million per year, including international concessional financing of about US$ 475 million. This includes US$ 460 million for accelerated development, US$ 10 million for global environmental issues and US$ 5 million for strengthening the capacity of international institutions.

Scientific and technological means:

107. National Governments, in cooperation with the appropriate United Nations agencies and international and regional research centres, should:

(a) Develop site-specific technologies at bench-mark sites and farmers fields that fit prevailing socio-economic and ecological conditions through research that involves the full collaboration of local populations;

(b) Reinforce interdisciplinary international research and transfer of technology in cropping and farming systems research, improved in situ biomass production techniques, organic residue management and agroforestry technologies.

Human resources development:

108. National Governments, in cooperation with the appropriate United Nations agencies and international and regional research centres, should:

(a) Train extension officers and researchers in plant nutrient management, cropping systems and farming systems, and in economic evaluation of plant nutrient impact;

(b) Train farmers and women's groups in plant nutrition management with special emphasis on top soil conservation and production.

Capacity-building:

109. National Governments should:

(a) Develop suitable institutional mechanisms for policy formulation to monitor and guide the implementation of integrated plant nutrition programmes through an interactive process involving farmers, research, extension services and other sectors of society;

(b) Strengthen advisory services and train staff, develop and test new technologies, provide incentives to farmers, and finance the costs of upgrading and maintaining the full productivity of soils in high potential areas.

K. RURAL ENERGY TRANSITION TO ENHANCE PRODUCTIVITY

Basis for action

110. **(PC/WG.I/CRP.12/Rev.1, para. 75)< Energy supplies in many countries are not commensurate with their development needs and are highly priced and unstable. In rural areas of the developing countries, the chief sources of energy are fuelwood, crop residues and manure, together with animal and human energy. More intensive energy inputs are required for increased productivity

of human labour and for income-generation. To this end, rural energy policies and technologies should promote a mix of cost-effective fossil and renewable energy sources that is itself sustainable and ensures sustainable agricultural development. Rural areas provide energy supplies in the form of wood. The full potential of agriculture and agroforestry as well as common property resources, as sources of renewable energy, is far from being realized. The attainment of sustainable rural development is intimately linked with energy demand and supply patterns.>**7/

Objectives

111. No later than the year 2000, to initiate and encourage a process of environmentally sound energy transition in rural communities, from unsustainable energy sources to structured and diversified energy sources by making available alternative new and renewable sources of energy.

112. To increase the energy inputs available for rural household and agro-industrial needs through planning and appropriate technology transfer and development.

112bis. To implement self-reliant rural programmes favouring sustainable development of renewable energy sources and improved energy efficiency.

Activities

Management:

113. Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

(a) Promote pilot plans and projects consisting of electrical, mechanical and thermal power (gasifiers, biomass, solar driers, wind-pumps and combustion systems) that are appropriate and likely to be adequately maintained;

(b) Initiate and promote on national rural energy programmes supported by technical training, banking and related infrastructure;

(c) Intensify research and the development, diversification and conservation of energy, taking into account the need for efficient use and environmentally sound technology.

Data and information:

114. Governments at the appropriate level, with the support of the relevant international and regional organizations should:

(a) Collect and disseminate data on rural energy supply and demand patterns related to energy needs for households, agriculture and agro-industry;

(b) Analyse sectoral energy and production data in order to identify rural energy requirements.

International and regional cooperation and coordination:

115. The appropriate United Nations agencies and regional organizations should, drawing on the experience and available information of NGOs in this field, exchange country and regional experience on rural energy planning methodologies in order to promote efficient planning and select cost-effective technologies.

Means of implementation

Financing and cost evaluation:

116. The total financing required to implement this programme area is about US$ 1,800 million per year, including international concessional financing of about US$ 265 million. This includes US$ 230 million for accelerated development, US$ 30 million for global environmental issues and US$ 5 million for strengthening the capacity of international institutions.

Scientific and technological means:

117. National Governments, as well as the private sector, should:

(a) Intensify public and private sector research in developing and industrialized countries on renewable sources of energy for agriculture;

(b) Undertake research and transfer of energy technologies in biomass and solar energy to agricultural production and post-harvest activities.

Human resources development:

118. National Governments and rural organizations should enhance public awareness of rural energy problems stressing the economic and environmental advantages of renewable energy sources.

Capacity-building:

119. National Governments should:

(a) Establish national institutional mechanisms for rural energy planning and management that would improve efficiency in agricultural productivity and reaching village and household level;

(b) Strengthen extension services and local organizations to implement plans and programmes for new and renewable sources of energy at village level.

Notes

1/ Some of the issues in these programme areas are presented in section I, chapter I, of Agenda 21, "Combating poverty and meeting basic needs".

2/ Some of the issues in these programme areas are presented in Agenda 21, section IV, chapter on "Capacity-building in developing countries".

3/ Discussed in section I, chapter 8, of Agenda 21, "Integration of environment and development in decision-making" (programme area A).

4/ Presented in section I, chapter 2, of Agenda 21, "Planning and management of land resources".

5/ Presented in section II, chapter 10, of Agenda 21, "Water for sustainable food production and sustainable rural development" (programme area F).

6/ The activities of this programme are related to some of the activities of section II, chapter 7, of Agenda 21, "Biological diversity".

7/ This programme area is related to some of the activities in section II, chapter 1, of Agenda 21, "Protection of the atmosphere" (programme area A), "Promoting sustainable energy development".

8/ This proposed programme area will be addressed in section II, chapter 1, of Agenda 21, "Protection of the atmosphere".

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Agenda Item 3 (a)

LAND RESOURCES: DEFORESTATION

Text submitted by the Chairman on the basis of preliminary discussions held on document A/CONF.151/PC/100/Add.16

Combating deforestation: options for Agenda 21

(Section II, Chapter 3 of Agenda 21)

Attached is the text of document A/CONF.151/PC/100/Add.16 as it has resulted from negotiations on 18 and 20 March 1992. The paragraphs in the introduction, basis for action and means for implementation have not yet been negotiated. Following the Chairman's proposal, programme area E on International and regional cooperation, included in document A/CONF.151/PC/100/Add.16, has been deleted.

INTRODUCTION

3. The proposed global objective of Agenda 21 on Forests could be **A/CONF.151/WG.I/CRP.13) "to achieve conservation and ensure sustainable management and sustainable development of all forests and tree-based resources to increase their contribution to overall socio-economic development, environmental protection and people's present and future quality of life."**

4. An important consideration, in the context of environment and sustainable development, is that the goods and services to be derived from trees, forests and forest lands are closely linked to areas covered in other sections of Agenda 21 such as those related to agriculture, mountain ecosystems, human settlements, land resources management, desertification control, oceans and

coastal areas, wildlife management, protection of fragile ecosystems, biodiversity, rural energy, freshwater resources, industrial needs and climate change. Neglecting trees, forests and forest lands will ultimately inflict serious negative impacts on the national human environment and its already fragile ecological and economic balance.

[4 bis In the developing countries the already ongoing Tropical Forestry Action Programme (TFAP) is the key instrument for achieving most of the objectives in the five programme areas. The TFAP is currently being implemented in more than 80 developing countries with the support of the international community.]

5. The activities outlined in this document are very closely related to, and have implications for, many of the programme areas described in other chapters, so an overall integrated approach is therefore necessary when addressing the following programme areas:

(a) Sustaining the multiple roles and functions of all types of forests, forest lands, and woodlands;

(b) Enhancement of the protection, sustainable management and conservation of all forests, and the greening of degraded areas through forest rehabilitation, afforestation, reforestation and other rehabilitative means;

(c) Promoting efficient utilization to recover the full valuation of the goods and services provided by forests, forest lands and woodlands;

(d) Establish and/or strengthen capacities for the planning, assessment and periodical evaluations of forest-related programmes progress, activities, including commercial trade and processes.

PROGRAMME AREAS

A. Sustaining the multiple roles and functions of all types of forests, forest lands, and woodlands

Basis for action

6. There are major weaknesses in the policies, methods and mechanisms adopted to support and develop the multiple ecological, economic, social and cultural roles of trees, forests and forest lands. In many countries, forest resources are being treated as free goods while in others they have been systematically depleted, impoverishing the quality of life of the people and restricting their options for development. In most developing countries, it is the lack of knowledge on the quality and quantity of forest resources which has led to the over-exploitation of the resource as these resources are normally seen as infinite. Many developed countries are confronted with the effects of air pollution and fire damage on their forests. More effective measures and approaches are often required at the national level to improve and harmonize policy formulation, planning and programming; legislative

measures and instruments; development patterns; participation of the general public, especially women; involvement of youth; roles of the private sector, local organizations, NGOs and cooperatives; development of technical and multidisciplinary skills and quality of human resources; forestry extension and public education; research capability and support; administrative structures and mechanisms, including intersectoral coordination, decentralization, and responsibility and incentive systems; dissemination of information and public relations. This is especially important to ensure a rational and holistic approach to a sustainable and environmentally sound development of forests. The need for securing the multiple roles of forests and forest lands through adequate and appropriate institutional strengthening has been repeatedly emphasized in many of the reports, decisions and recommendations by FAO, ITTO, UNEP, the World Bank, IUCN, and other organizations.

Objectives

7. Strengthen forest related national institutions, to enhance the scope and effectiveness of activities related to management, conservation and sustainable development of forests, and to effectively ensure sustainable utilization and production of forests' goods and services in both developed and developing countries. By the year 2000, strengthen the capacities and capabilities of national institutions to enable them to acquire necessary knowledge for the protection and conservation of forests as well as in expanding their scope and correspondingly enhancing effectiveness of programmes and activities related to management and development of forests.

8. Strengthen and improve human, technical and professional skills as well as expertise and capabilities to effectively formulate and implement policies, plans, programmes, research and projects on management, conservation and sustainable development of all types of forests and forest based resources, forest lands inclusive, as well as other areas from where forest benefits can be derived.

Activities

Management related:

9. Governments, at the appropriate levels, with the support of regional, sub-regional and international organizations, should enhance institutional capability to promote the multiple roles and functions of all types of forests and vegetation inclusive of other related lands and forest based resources in supporting sustainable development and environmental conservation in all sectors. This should be done wherever possible and necessary by strengthening and/or modifying the existing structures and arrangements, and improving cooperation and the coordination of their respective roles. Some of the major activities in this regard are:

(a) Rationalize and strengthen administrative structures and mechanisms, including provision of adequate levels of staff and allocation of responsibilities, decentralization of decision-making, provision of

infrastructural facilities and equipment, intersectoral coordination and an effective system of communication;

(b) Promote participation of the private sector, labour unions, rural cooperatives, local communities, indigenous people, youth, women, users groups and NGOs in forest related activities, and access to information and training programmes within the national context;

(c) Review and, if necessary, revise measures and programmes relevant to all types of forests and vegetation, inclusive of other related lands and forest based resources and relate them to other land uses and development policies and legislation; promote adequate legislation and other measures as a basis against uncontrolled conversion to other types of land uses;

(d) Develop and implement plans and programmes, including definition of national, and if necessary, regional and sub-regional goals, programmes and criteria for their implementation and subsequent improvement;

(e) Establish, develop and sustain an effective system of forest extension and public education to ensure better awareness, appreciation, and management of forests with regard to the multiple roles and values of trees, forests and forest lands;

(f) Establish and/or strengthen institutions and facilities for forest education and training as well as in forestry industries for developing an adequate cadre of trained and skilled staff at the professional, technical and vocational levels, with emphasis on youth and women.

(g) Establish and strengthen facilities and capabilities for research related to the different aspects of forests and forest products, for example on sustainable management of forests, research on biodiversity, on the effects of, and relations with the impact of climate change on forests, effects of acid rains, traditional uses of forest resources by local populations, and on improving market returns and other non-market values from the management of forests, etc.

Data and information

10. Governments, at the appropriate level, with the assistance and cooperation of international, regional, subregional and bilateral agencies should develop adequate database and baseline information necessary for planning and programme evaluation. The following are some of the more specific activities:

(a) Collect, compile and regularly update and distribute information on land classification and land use, including data on forest cover, areas suitable for afforestation, endangered species, ecological values, biomass and productivity and correlate demographic, socio-economic and forest resources information at micro- and macro-levels, and undertake periodic analysis of forest programmes;

(b) Establish linkages with other data systems and sources relevant to supporting forest management, conservation and development while further developing or reinforcing existing systems such as geographic information systems as appropriate;

(c) Create mechanism to ensure public access to this information.

International and regional cooperation and coordination:

11. Governments, at the appropriate level, and institutions should cooperate in the provision of expertise and funds, promote international research efforts, in particular with a view to enhancing transfer of technology and specialized training and ensuring access to experiences and research results. There is need for strengthening coordination and improving the performance of existing forest related international organizations in providing technical cooperation and support to interested countries for the management, conservation and sustainable development of forests.

Means of implementation

Financial and cost evaluation:

12. Annual estimated funding required to implement these activities is about US$ 2,500 million for the period 1993-2000. A major part required will need to be financed from national governments, the private sector and in some cases, NGOs.

13. The estimated amount of international financing required, annually, for developing countries has been estimated at US$ 860 million, of which US$ 840 million are related to accelerating development and US$ 20 million for strengthening the capacity of international institutions. Accelerating development would consist of implementing management-related and data/information activities listed above.

Scientific and technological means:

14. The planning, research and training activities specified will form the scientific and technological means for implementing the programme, as well as its output. The systems, methodology and know-how generated by the programme will help improve efficiency. Some of the specific steps involved should include:

(a) Analysis of achievements, constraints and social issues for supporting policy analysis, formulation and implementation;

(b) Analysis of research problems and research needs, research planning and implementation of specific research projects;

(c) Assessment of needs for human resources, skill development and training;

(d) Development, testing and application of appropriate methodologies/approaches in implementing forest policies, programmes and plans.

Human resources development:

15. The specific components of forest education and training will effectively contribute to human resources development. These include:

(a) Launching of graduate and post-graduate degree, specialization and research programmes;

(b) Strengthening of pre-service and in-service training programmes at the technical and vocational levels, including training of trainers/teachers, and developing curriculum and teaching materials/methods;

(c) Special training for staff of national forest related organizations in aspects such as project formulation, evaluation and periodical evaluations.

Capacity building:

16. This programme area is specifically concerned with capacity building in the forest sector and all programme activities specified contribute to that end. In building new and improved capacities, full advantage should be taken of the existing systems and experience.

B. Enhancement of the protection, sustainable management and conservation of all forests, and the greening of degraded areas, through forest rehabilitation, afforestation, reforestation and other rehabilitative means

Basis for action

17. Forests worldwide have been and are threatened by uncontrolled degradation and conversion to other types of land uses, influenced by increasing human needs; agricultural expansion; environmentally harmful mismanagement, which includes, for example, lack of adequate forest fire control and anti-poaching measures, unsustainable commercial logging, overgrazing and unregulated browsing, harmful effects of airborne pollutants, economic incentives and other measures taken by other sectors of the economy which may lead to accelerated deforestation and changes in climate. The impacts of loss and degradation of forests are in the form of soil erosion; loss of biological diversity, damage to wildlife habitat and degradation of watershed areas, deterioration of the quality of life and reducing the options for development.

18. The present situation calls for urgent and consistent action for the need to conserve and sustain forest resources. Greening of suitable areas, in all its component activities, is an effective way of increasing public awareness and participation in protecting and managing forest resources. It should

include the consideration of land use and tenure patterns and local needs and should spell-out and clarify the specific objectives of the different types of greening activities.

Objectives

19. Maintain existing forests through conservation and management, and sustain and expand areas under forest and tree cover, in appropriate areas of both developed and developing countries through conservation of native forests, protection, forest rehabilitation, regeneration, afforestation, reforestation, tree planting, with a view to maintaining or restoring the ecological balance and expanding their contribution to human needs and welfare.

[19 bis As appropriate prepare and implement National Forestry Action Programmes and/or plans for the management, conservation and sustainable development of forests. These plans and/or programmes should be integrated with other land-uses.]

20. Ensure the sustainable management, and where appropriate, conservation of existing and future forest resources.

21. Increase the ecological, biological, climatic, socio-cultural and economic contributions of forest resources.

Activities

Management related:

22. Governments should recognize the importance of categorizing forests, in the framework of long-term forest conservation and management policy, into different forest types and setting up sustainable units in every region/watershed with a view to securing the forest conservation. Governments, with the participation of the private sector, non-governmental organizations, local community groups, indigenous people, local government units and the public at large should act to maintain and expand the existing vegetative cover wherever ecologically, socially and economically feasible, through technical cooperation and other forms of support. Major activities to be considered are:

(a) Ensure a sustainable management of all forest ecosystems, including natural forest management and woodlands, through improved proper planning, management, and timely implementation of silvicultural operations, including inventory and relevant research as well as rehabilitation of degraded natural forests to restore productivity and environmental contributions giving particular attention to human needs for economic and ecological services, wood-based energy, agroforestry, non-timber forest products and services, watershed and soil protection, wildlife management, and forest genetic resources;

(b) Establish, expand and manage, as appropriate to each national context, Protected Area Systems, which includes systems of conservation units for their environmental, social and spiritual functions and values, including conservation of forests in representative ecological systems and landscapes, old-growth forests, conservation and management of wildlife, conservation of genetic resources involving in situ and ex situ measures and undertaking supportive measures to ensure sustainable utilization of biological resources and conservation of biological diversity and the traditional habitats of indigenous forest people;

(c) Undertake and promote buffer and transition zone management;

(d) Carry out revegetation in appropriate mountain areas, highlands, bare lands, degraded farm lands, arid and semi-arid lands and coastal areas for combating desertification and preventing erosion problems and for other protective functions and national programmes for rehabilitation of degraded lands, including community forestry, social forestry, agroforestry and silvopasture while also taking into account the role of forests as national carbon reservoirs and sinks;

(e) Develop industrial and non-industrial forestry plantations in order to support and promote national ecologically sound afforestation and reforestation/regeneration programmes in suitable sites, including up-grading of existing plantations of both industrial and non-industrial and commercial purpose to increase their contribution to human needs and natural forest preservation. Measures should be undertaken to promote and provide intermediate yields and to improve the rate of returns on investments in plantation, through interplanting and underplanting valuable crops in plantation;

(f) Develop/strengthen a national and/or master plan for forest plantations as a priority, indicating inter alia the location, scope, species, specifying area of existing plantation requiring rehabilitation, taking into account the economic aspect, for future plantation development giving emphasis to native species;

(g) Increase protection of forests from pollutants, fire, pests and diseases and other human-made interferences such as forest poaching, mining, and unmitigated shifting cultivation, introduction of exotic plant and animal species as well as develop and accelerate research for a better understanding of problems relating to the management and regeneration of all types of forests. Strengthen and/or establish appropriate measures to check inter-border movement of plants and related materials;

(h) Stimulate development of urban forestry for greening of urban, peri-urban and rural human settlements for amenity, recreation and production purposes and for protecting trees and groves;

(i) Launch or improve opportunities for involvement of all people, including youth, women, indigenous people and local communities in the

formulation, development and implementation of forest-related programmes and other activities taking due account of the local needs and cultural values;

(j) Limit and aim to halt destructive shifting cultivation by addressing the underlying social and ecological causes.

Data and information:

23. The management-related activities should involve collection, compilation and analysis of data/information, including baseline surveys. The following are some of the specific activities:

(a) Carry out surveys and develop and implement land use plans for appropriate greening/planting/afforestation/reforestation/forest rehabilitation;

(b) Consolidate and update land use and forest inventory and management information for management and land use planning of wood and non-wood resources, including data on shifting cultivation and other agents of forest destruction;

(c) Consolidate information on genetic resources and related bio-technology, including surveys and studies as necessary;

[(cbis) Carry out surveys and research on local/indigenous knowledge of trees and forests and their uses to improve the planning and implementation of sustainable forest management;]

(d) Compile and analyse research data on species/site interaction of species used in forest plantations and assess the potential impact on forests of climatic change as well as effects of forests on climate, and initiate in-depth studies on the carbon cycle relating to different forest types to provide scientific advice and technical support;

(e) Establish linkages with other data/information sources that relate to sustainable management and use of forests and improve access to data and information;

(f) Develop and intensify research to improve knowledge and understanding of problems and natural mechanism related to the management and rehabilitation of forests, including research on fauna and its interrelation with forests;

(g) Consolidate information on forest conditions and site-influencing immissions and emissions.

International and regional cooperation and coordination:

24. Greening of appropriate areas is a task of global importance and impact. The international and regional community should provide technical cooperation and other means for this programme. Specific activities of international nature, in support of national efforts, should include the following:

(a) Increase cooperative actions to reduce pollutants and trans-boundary impacts affecting the health of trees and forests and conservation of representative ecosystems;

(b) Coordinate regional and subregional research on carbon sequestration, air pollution and other environmental issues;

(c) Document and exchange information/experience for the benefit of countries with similar problems and prospects;

(d) Strengthen the coordination and improve the capacity and ability of intergovernmental organizations such as FAO, ITTO, UNEP, UNESCO, to provide technical support for the management, conservation and sustainable development of forests.

Means of implementation

Financial and cost evaluation:

25. The estimated annual financing required to implement these activities is about US$ 10 billion for the period 1993-2000. Of this amount about US$ 3.7 billion in international financing will be needed for developing countries. From that amount US$ 3,510 million are related to accelerating development; US$ 150 million are needed for global environmental issues and US$ 20 million for strengthening the capacity of international institutions.

Scientific and technological means:

26. Data analysis, planning, research, transfer/development of technology and/or training activities form an integral part of the programme activities, providing the scientific and technological means of implementation. National institutions should:

(a) Develop feasibility studies and operational planning related to major forest activities;

(b) Develop and apply environmentally sound technology relevant to the various activities listed;

(c) Increase action related to genetic improvement and application of biotechnology for improving productivity and tolerance to environmental stress and including, for example, tree breeding, seed technology, seed procurement networks, germplasm banks, "in vitro" techniques, in situ and ex situ conservation.

Human resources development:

27. Essential means for effectively implementing the activities include training and development of appropriate skills, working facilities and conditions, public motivation and awareness. Specific activities include:

(a) Provide specialized training in planning, management, environmental conservation, biotechnology, etc;

(b) Establish demonstration areas to serve as models and training facilities;

(c) Support local organizations, communities, NGOs, private land owners, in particular women, youth, farmers and indigenous people/shifting cultivators, through extension, provision of inputs and training.

Capacity building:

28. The national Governments, the private sector, local organizations/communities, labour unions and NGOs should develop capacities, duly supported by relevant international agencies, to implement the programme activities. Such capacity should be developed and strengthened in harmony with the programme activities. Capacity-building activities include policy and legal frameworks, national institution building, human resource development, development of research and technology, development of infrastructure, enhancement of public awareness, etc.

C. Promoting efficient utilization and assessment to recover the full valuation of the goods and services provided by forests, forest lands and woodlands

Basis for action

29. The vast potential of forests and forest lands as a major resource for development is not yet fully realized. Improved management of forests can increase the production of goods and services and in particular the yield of wood and "Non-Wood Forest Products", thus helping generate additional employment and income, addition of value through processing and trade of forest products, increase contribution to foreign exchange earnings, and increase return on investment. Forest resources, being renewable, can be sustainably managed in a manner that is compatible with environmental conservation. It is also possible to increase the value of forests through "non-damaging" uses such as eco-tourism and managed supply of genetic materials. There is need for concerted action in order to increase people's perception of the value of forests and of the benefits they provide. The survival of the forests and their continued contribution for human welfare depends highly on succeeding in this endeavour.

Objectives

30. Improve recognition of the social, economic and ecological values of trees, forests and forest lands including the consequences of the damage caused by the lack of forest. Promote methodologies in view to incorporate social, economic and ecologic values of trees, forest and forest lands into the national economic accounting systems. Ensure their sustainable management in a way which is consistent with land use, environmental considerations and development needs.

31. Promote efficient, rational and sustainable utilization of all types of forests and vegetation inclusive of other related lands and forest-based resources, including through the development of efficient forest-based processing industries, value-adding secondary processing and trade in forest products, based on sustainably managed forest resources and in accordance with plans which integrate all wood and non-wood values of forests.

[31 bis Promote more efficient and sustainable use of forest and trees for fuelwood and energy supply.]

[31 ter Promote more comprehensive use and economic contributions of forest areas by incorporating eco-tourism into forest management and planning.]

Activities

Management related:

32. Governments, the private sector, scientific institutions, NGOs, cooperatives and entrepreneurs should undertake the activities below, properly coordinated at the national level along with financial and technical cooperation from international agencies. Major activities to be considered are:

(a) Carry out detailed investment studies, supply-demand harmonization and environmental impact analysis to rationalize and improve trees and forest utilization and to develop and establish appropriate incentive schemes and regulatory measures, including tenurial arrangements, to provide a favourable investment climate and promote better management;

(b) Formulate scientifically sound criteria and guidelines for the management, conservation and sustainable development of all types of forests;

(c) Improve environmentally sound methods and practices of forest harvesting which are ecologically sound and economically viable, including planning and management, improved use of equipment, storage and transportation to reduce and if possible maximize the use of waste, and improve value of both wood and non-wood forest products;

(d) Promotion of a better use and development of natural forests and woodlands, including forest plantations, wherever possible, through

appropriate and environmentally sound and economically viable activities including silvicultural practices and management of other plant and animal species;

(e) Promote and support the downstream processing of forest products to increase retained value and other benefits;

(f) Promote/popularize non-wood forest products and other forms of forest resources, apart from fuelwood (e.g. medicinal plants, dyes, fibres, gums, resins, fodder, cultural products, rattan, bamboo etc.) through programmes and social forestry/participatory forest activities, including research on their processing and uses;

(g) Develop, expand and/or improve effectiveness and efficiency of forest-based processing industries, both wood and non-wood based, involving such aspects as efficient conversion technology and improved sustainable utilization of harvesting and process residues; promotion of underutilized species in natural forests through research, demonstration and commercialization; promotion of value-adding secondary processing for improved employment, income and retained value; and promotion/improvement of markets for, and trade in, forest products through relevant institutions, policies and facilities.

(h) Promote and support the management of wildlife, including farming, as well as to encourage and support the husbandry and cultivation of wild species (e.g. for food, hides and skin, bones and horns, eco-tourism, etc.), for improved rural income and employment, ensuring economic and social benefits without harmful ecological impacts;

(i) Promote appropriate small-scale forest-based enterprises for supporting rural development and local entrepreneurship;

(j) Improve and promote methodologies for the comprehensive assessment that will capture the full value of forests with a view to including this value in the market-based pricing structure of wood and non-wood based products;

(k) Harmonize sustainable development of forests with national development and trade policies which are compatible with the ecologically sound use of forest resources, using for example the ITTO Guidelines for Sustainable Management of Tropical Forests;

(l) Develop, adopt and strengthen national programmes for accounting the economic value of forests.

Data and information:

33. The objectives and the management related activities presuppose data and information analysis, feasibility studies, market surveys and review of technological information. Some of the relevant activities include:

(a) Undertake analysis of supply and demand for forest products and services, to ensure efficiency in their utilization, wherever necessary;

(b) Carry out investment analysis and feasibility studies, including environmental impact assessment, for establishing forest-based processing enterprises;

(c) Conduct research on the properties of currently underutilized species for their promotion and commercialization;

(d) Support market surveys of forest products for trade promotion and intelligence;

(e) Facilitate the provision of adequate technological information as a measure to promote better utilization of forest resources.

International and regional cooperation and coordination:

34. Cooperation and assistance of international agencies and the international community in technology transfer, specialization, and promotion of fair terms of trade, without resorting to unilateral restrictions and/or bans on forest products contrary to GATT agreements, the application of appropriate market mechanisms and incentives will help in addressing global environmental concerns. Strengthening of the coordination and performance of existing international organizations and in particular FAO, UNIDO, UNESCO, UNEP, ITC/UNCTAD/GATT, ITTO and ILO for providing technical assistance and guidance in this programme area is another specific activity.

Means of implementation

Financial and cost evaluation:

35. Estimated annual financing required to implement the programme activities is about US$ 18 billion, for the period 1993-2000. The bulk of it is expected to be invested by the private sector. Part of it will also be invested by the national governments. Smaller investments will come from cooperatives and households. International assistance will, however, act as a catalyst and stimulant to promote development.

36. The amount of international financing, required annually by developing countries has been estimated at US$ 880 million of which US$ 660 million are related to accelerated development; US$ 200 million for global environmental issues and US$ 20 million for strengthening the capacity of international organizations.

Scientific and technological means:

37. The programme activities pre-suppose major research efforts and studies as well as improvement of technology. This should be coordinated by national governments in collaboration with, and supported by, relevant international agencies and institutions. Some of the specific components include:

(a) Research on properties of wood and non-wood products and on their uses, to promote improved utilization;

(b) Development and application of environmentally sound and less-polluting technology for forest utilization;

(c) Models and techniques of outlook analysis and development planning;

(d) Scientific investigations on the development and utilization of non-timber forest products;

(e) Appropriate methodologies to comprehensively assess the value of forests.

Human resources development:

38. The success and effectiveness of the programme depends on availability of skilled personnel. Specialized training is an important factor in this regard. New emphasis should be given to the incorporation of women. Human resource development for programme implementation, in quantitative and qualitative terms should include:

(a) Develop the required specialized skills to implement the programme, including establishment of special training facilities at all levels;

(b) Introduce/strengthen refresher training courses, including fellowships and study tours, to update skills and technological know-how and improve productivity;

(c) Strengthen capability for research, planning, economic analysis, periodical evaluations and evaluation, relevant to improved utilization of forest resources;

(d) Promote efficiency and capability of private and cooperative sectors through provision of facilities and incentives.

Capacity building:

39. Capacity building, including strengthening of existing capacity, is implicit in the programme activities. Improving administration, policy and plans, national institutions, human resources, research and scientific capabilities, technology development, and periodical evaluations and evaluation are important components of capacity building.

D. Establish and/or strengthen capacities for the planning, assessment and periodical evaluations of forests and related programmes, progress, activities, including commercial trade and processes

Basis for action

40. Assessment and periodical evaluations are essential components of long-term planning, for evaluating effects, quantitatively and qualitatively, and for rectifying inadequacies. This mechanism, however, is one of the often neglected aspects of forest resources, management, conservation and development. In many cases, even the basic information related to the area and types of forests, existing potential and volume of harvest etc. is lacking. In many developing countries, there is a lack of structures and mechanisms to carry out these functions. There is an urgent need to rectify this situation for a better understanding of the role and importance of forests and to realistically plan for their effective conservation, management, regeneration, sustainable development.

Objectives

41. Strengthen or establish systems for the assessment and periodical evaluations of forest and forest lands with a view to assessing the impacts of programmes, projects and activities on the quality and extent of forest resources, land available for afforestation, land tenure, and to integrate the systems in a continuing process of research and in-depth analysis, while ensuring necessary modifications and improvements for planning and decision-making process. Specific emphasis should be given to the participation of the rural people in these processes.

42. Provide the economic operators, planners, decision makers and local communities with sound and updated adequate information on forest and forest land resources.

Activities

Management related:

43. Governments and institutions in collaboration, where necessary, with appropriate international agencies and organizations, universities and NGOs, should undertake assessments and periodical evaluations of forests and related programmes and processes with a view to their continuous improvement. This should be linked to related activities of research and management and, wherever possible, be built upon existing systems. Major activities to be considered are:

(a) Assess and periodically evaluate the quantitative and qualitative situation and changes of forest cover and forest resources endowments, including land classification, land use and its status updates, at the

appropriate national level, and link this activity, as appropriate, with planning as a basis for policy and programme formulation;

(b) Establish national assessment and periodical evaluations systems and evaluation of programmes and processes, including establishment of definitions, standards, norms, and intercalibration methods, and capability for initiating corrective actions as well as improving formulation and implementation of programmes and projects;

(c) Make estimates of impacts of activities affecting forestry developments and conservation proposals, in terms of key variables such as developmental goals, benefits and costs, contributions of forests to other sectors, community welfare, environmental conditions and biological diversity and their impacts at the local, regional and global levels where appropriate, to assess the changing needs of countries;

(d) Carry out studies and investigations regarding influence of forests on carbon storage, climatic changes, greenhouse gases, etc., and on the effects of those processes on trees and forests;

(e) Develop national systems of forest resource assessment and valuation, including necessary research and data analysis, which account for, where possible, the full range of wood and non-wood forest products and services, and incorporate results in plans and strategies and, where feasible, in national systems of accounts and planning;

(f) Establish necessary inter-sectoral and programme linkages, including improved access to information in order to support a holistic approach to planning and programming.

Data and information:

44. Reliable data and information are vital to this programme. The national Governments, in collaboration, where necessary, with relevant international agencies, should, as appropriate, undertake to continuously improve data and information and ensure its exchange. Major activities to be considered are:

(a) Collect, consolidate and exchange existing information and establish baseline information on aspects relevant to this programme;

(b) Harmonize the methodologies for programmes involving data and information activities to ensure accuracy and consistency;

(c) Undertake special surveys on, for example, land capability and suitability for afforestation action;

(d) Enhance research support and improve access to and exchange of research results.

International and regional cooperation and coordination:

45. The international community should extend to the Governments concerned necessary technical and financial support for implementing this programme, including the following:

(a) Establish conceptual framework and formulate acceptable criteria, norms and definitions for periodical evaluations and assessment of forest resources;

(b) Establish national institutional coordination mechanisms for forest assessment and periodical evaluations activities;

(c) Strengthen existing regional and global networks for exchange of relevant information where existing mechanisms cannot be strengthened to perform the task;

(d) Strengthen the capacity of existing international organizations such as FAO, ITTO, UNEP, UNESCO and UNIDO to provide technical support and guidance in this programme area.

Means of implementation

Financial and cost evaluation:

46. Estimated annual financing required to implement the activities is about US$ 750 million for the period 1993-2000. About 70 per cent of the required financing will come from national governments and from the private sector. The amount of annual international financing required, by developing countries has been estimated at US$ 230 million, of which US$ 180 million are related to accelerating development, US$ 30 million for global environmental issues and US$ 20 million for strengthening the capacity of international organizations.

47. Accelerating development consists of implementing the management-related and data/information activities cited above. Activities related to global environment issues are those which will contribute to the global information for assessing/evaluating/addressing environmental issues on worldwide basis. Strengthening the capacity of international institutions consists of enhancing the technical staff and the executing capacity of several international organizations in order to meet the requirements of countries.

Scientific and technological means:

48. Assessment and periodical evaluations activities involve major research efforts, statistical modelling and technological innovation. These have been internalized into the management-related activities. The activities in turn will improve the technology and scientific content of assessment and periodical evaluations. Some of the specific scientific and technological components included under the activities are:

(a) Development of technical, ecological and economic methods and models related to periodical evaluations and evaluation;

(b) Development of data systems, data processing and statistical modelling;

(c) Remote sensing and ground surveys;

(d) Development of Geographic Information Systems (GIS);

(e) Assessment and improvement of technology.

49. These are to be linked and harmonized with similar activities and components in the other programmes.

Human resources development:

50. The programme activities foresee the need, and include provision for human resource development in terms of specialization (e.g. the use of remote sensing, mapping, statistical modelling), training, technology transfer, fellowships, and field demonstrations.

Capacity building:

51. The national governments in collaboration with appropriate international agencies and institutions should develop the necessary capacity for implementing this programme. This should be harmonized with capacity building for other programmes. Capacity building should cover such aspects as policies, public administration, national level institutions, human resource and skill development, research capability, technology development, information system, programme evaluation, intersectoral coordination and international cooperation.

52. Funding of international and regional cooperation. The estimated investment required annually to implement international and regional cooperation is estimated at about US$ 750 million, for the period 1993-2000. Nearly 70 per cent of the required financing would come from international sources. The amount of international financing required annually has been estimated to be US$ 530 million of which US$ 430 million are related to accelerating development; US$ 80 million for global environmental issues and US$ 20 million for strengthening the capacity of international organizations.